Note: Appendices are under review at HQUSACE. Pages with revised references will be distributed when review is complete.

CHAPTER 5

PLANNING PRINCIPLES

SECTION I - PRINCIPLES AND GUIDELINES (Standards Only)

5-1. Purpose. This section provides principles and standards to be used in Corps planning studies.

a. The Water Resource Council's Economic and Environmental Principles for Water and Related Land Resources (February 3, 1983) are adopted as the principles to be used, and are in Appendix C. The Water Resource Council's Economic and Environmental Guidelines for Water and Related Land Resources Implementation Studies, Chapter I - Standards (March 10, 1983) have been adopted as the standards to be used, and are presented in their entirety in the following paragraphs of this section. Chapter II "National Economic Development Benefits Evaluation Procedure" and Chapter III "Environmental Quality Evaluation Procedures" contained in the March 10, 1983 Principles and Guidelines are now described in Chapters 6 and 7, respectively of this regulation. The original format of the Guidelines has been changed to conform to the engineering regulation format.

b. The Standards begin at paragraph 5-2. The Standards are extended and clarified by adding material addressing single purpose and multipurpose ecosystem restoration planning. Insertions are identified by enclosing them within brackets [ ]; no other change to wording or interpretation of the Standards is made or intended.

c. Ecosystem restoration is a Corps high priority mission. Thus, extensions of the Standards are made addressing the following issues:

(1) Ecosystem restoration contributes to national ecosystem restoration (NER). Single purpose plans are developed and evaluated in terms of their net contributions to NER. That plan making the maximum contribution to net NER is designated the NER plan, and the NER plan will usually be the recommended plan.

(2) Multipurpose plans which include ecosystem restoration contribute to both NED and NER. Multipurpose plans including ecosystem restoration are developed and evaluated so that an optimum tradeoff plan maximizing the sum of the net contributions to NED and NER is designated, and usually recommended.

(3) Positive and adverse effects of ecosystem restoration plans are displayed in the EQ

account as separate entries.

d. Additional planning standards which have been instituted subsequent to the referenced principles and standards are presented in Section II of this chapter.

5-2. Introduction.

a. Purpose and Scope.

(1) These Guidelines establish standards and procedures for use by Federal agencies in formulating and evaluating alternative plans for water and related land resources implementation studies. These Guidelines implement the Principles for Water and Related Land Resources Implementation Studies.

(2) These Guidelines are for Federal administrative purposes and shall not create any substantive or procedural rights in private parties.

(3) Departures in an individual study from these Guidelines are to be documented and justified in the study report.

(4) Implementation studies are pre- or postauthorization project formulation or evaluation studies undertaken by a Federal agency. Studies for the following agency activities are covered:

(a) Corps of Engineers (Civil Works) water resources project plans.

(b) Bureau of Reclamation water resources project plans.

(c) Tennessee Valley Authority water resources project plans.

(d) Soil Conservation Service water resources project plans.

(5) These Guidelines establish the basic process for Federal agencies in carrying out implementation studies. Activities conducted pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321, et. seq.) are to be fully integrated with this process.

(6) The accounts described in these Guidelines encompass and are consistent with the concept of human environment as used in NEPA and the appropriate portions of the NEPA regulations established by the Council on Environmental Quality (CEQ) in 40 CFR Parts

1500-1508.

b. Authority. These Guidelines are established pursuant to Section 103 of the Water Resources Planning Act (Pub. L. 89-80) and Executive Order 11747.

c. Applicability.

(1) These Guidelines apply to implementation studies completed more than 120 days after issuance of the Guidelines. Studies completed within 120 days should be concluded in accordance with the guidance applicable to them prior to issuance of these Guidelines.

(2) Preauthorization or postauthorization studies are considered completed when the appropriate planning documents have been approved by the responsible agency's field office. [

(3) In the case of reevaluation studies in which there is no reformulation of the plan, the portions of this chapter dealing with plan formulation do not apply.

(4) The administrator of each Federal or Federally assisted program covered is responsible for applying these Guidelines.

5-3. The Federal Objective.

a. The Federal objective of water and related land resources planning is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements.

b. Contributions to national economic development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed.

[c. Ecosystem restoration is considered a high priority Corps project purpose.

d. In water and related land resources planning which involves restoration of ecosystems, contributions are to national ecosystem restoration (NER). Contributions to restoration of the Nation’s ecosystems are net improvements in national environmental health. Ecosystem restoration benefits are usually not valued in monetary terms. Restoration contributions may accrue in the planning area and the rest of the nation.

e. Protection of the Nation's environment is achieved when damage to the environment is eliminated or avoided and important cultural and natural aspects of our nation's heritage are preserved. Various environmental statutes and executive orders assist in ensuring that water resources planning is consistent with protection. The objectives and requirements of applicable laws and executive orders are considered throughout the planning process in order to meet the Federal objective.]

f. The Federal objective for the relevant planning setting should be stated in terms of an expressed desire to alleviate problems and realize opportunities related to the output of goods and services or to increased economic efficiency [consistent with protecting the environment. Water and related land resources project plans shall be formulated to alleviate problems and take advantage of opportunities in ways that contribute to this objective.] [Note: The immediately preceeding statement, i.e. in the brackets, is in the principles but was not carried into the standards.]

g. Each statement of a problem or opportunity should be expressed in terms of a desired output. Example statements are--

(1) Reduce flood losses in the Red River floodplain to increase agriculture production;

(2) Reduce the cost of agricultural production in the irrigated sector of Tolland County; and

(3) Increase the value of the recreational experience at Lake Zoar.

[(4) Improve the habitat quality of the riverine backwater fish community.]

5-4. Summary of the Planning Process.

a. Introduction. The planning process consists of a series of steps that identifies or responds to problems and opportunities associated with the Federal objective and specific State and local concerns, and culminates in the selection of a recommended plan. The process involves an orderly and systematic approach to making determinations and decisions at each step so that the interested public and decision makers in the planning organization can be fully aware of: the basic assumptions employed; the data and information analyzed; the areas of risk and uncertainty; the reasons and rationales used; and the significant implications of each alternative plan.

b. Major Steps.

(1) The planning process consists of the following major steps:

(a) Specification of the water and related land resources problems and opportunities (relevant to the planning setting) associated with the Federal objective and specific State and local concerns.

(b) Inventory, forecast, and analysis of water and related land resource conditions within the planning area relevant to the identified problems and opportunities.

(c) Formulation of alternative plans.

(d) Evaluation of the effects of the alternative plans.

(e) Comparison of alternative plans.

(f) Selection of a recommended plan based upon the comparison of alternative plans.

(2) Plan formulation is a dynamic process with various steps that should be iterated one or more times. This iteration process, which may occur at any step, may sharpen the planning focus or change its emphasis as new data are obtained or as the specification of problems or opportunities changes or becomes more clearly defined.

c. Specification of the Problems and Opportunities Associated With the Federal Objective and Specific State and Local Concerns.

(1) The desire to alleviate problems and realize opportunities should be specified for the planning area in terms of the Federal objective and specific State and local concerns. The problems and opportunities should be defined so that their definition does not dictate a narrow range of alternatives.

(2) The problems and opportunities should be defined in such a way that meaningful levels of achievement can be identified. This will facilitate the formulation of alternative plans in cases in which there may be financial, environmental, technical, legislative, or administrative constraints on the total alleviation of a problem or realization of an opportunity.

(3) The problems and opportunities should be stated for both current and future conditions. Desired conditions for the future should be explicitly stated.

(4) The problems and opportunities should reflect the specific effects that are desired by groups and individuals as well as the problems and opportunities declared to be in the national interest by the Congress or the Executive Branch. This identification and detailing of problems

and opportunities is the process of making explicit the range of preferences and desires of those affected by resource development. It should be understood that the initial expressions of problems and opportunities may be modified during the planning process.

d. Inventory and Forecast of Water and Related Land Resource Conditions. The potential for alleviating problems and realizing opportunities is determined during inventorying and forecasting. The inventory and forecast of resource conditions should be related to the problems and opportunities previously identified.

e. Formulation of Alternative Plans. Alternative plans are to be formulated in a systematic manner to insure that all reasonable alternatives are evaluated. Usually, a number of alternative plans are identified early in the planning process and become more refined through additional development and through subsequent iterations. Additional alternative plans may be introduced at any time.

f. Evaluation of Effects.

(1) General. The evaluation of the effects of each alternative plan consists of assessment and appraisal.

(2) Assessment. Assessment is the process of measuring or estimating the effects of an alternative plan. Assessment determines the difference between without-plan and with-plan conditions for each of the categories of effects.

(3) Appraisal.

(a) Appraisal is the process of assigning social values to the technical information gathered as part of the assessment process.

(b) Since technical data concerning benefits and costs in the NED account are expressed in monetary units, the NED account already contains a weighting of effects; therefore, appraisal is applicable only to the EQ, RED, and OSE evaluations.

(4) Displays. The results of the evaluation should be displayed according to the directions provided in Paragraph 5-9 --Displays.

g. Comparison of Alternative Plans.

(1) The comparison of plans focuses on the differences among the alternative plans as determined in the evaluation phase.

(2) The differences should be organized on the basis of the effects in the four accounts or on a combination of the NED account and another appropriate format for other significant effects.

h. Plan Selection. After consideration of the various alternative plans, their effects, and public comments, a plan is selected following the general guidance in Paragraph 5-11--Plan Selection.

5-5. General Planning Considerations.

a. Federal-State Relationship in Planning.

(1) The responsible Federal planning agency is to contact the Governor or designated agency for each affected State before initiating a study and enter into such agreements as are appropriate to carry out a coordinated planning effort.

(2) The State agency or agencies responsible for or concerned with water planning are to be provided with appropriate opportunities to participate in defining the problems and opportunities, in scoping the study, and in review and consultation.

b. International Consultations. When a Federal water project is likely to have a significant impact on any land or resources situated in a foreign country or to affect treaty obligations, the responsible Federal planning agency, through the Department of State, should enter into consultations with the government of the affected country, with a view to determining the international implications of the project under consideration.

c. General Public Participation.

(1) Interested and affected agencies, groups, and individuals should be provided opportunities to participate throughout the planning process. The responsible Federal planning agency should contact and solicit participation of: other Federal agencies; appropriate regional, State, and local agencies; national, regional and local groups; other appropriate groups such as affected Indian tribes; and individuals. A coordinated public participation program should be established with willing agencies and groups.

(2) Efforts to secure public participation should be pursued through appropriate means such as public hearings, public meetings, workshops, information programs, and citizen committees.

d. Review and Consultation. Review and consultation with interested and affected agencies, groups, and individuals are needed in the planning process. Reviews are to be consistent with the requirements of applicable Federal statutes and the CEQ NEPA regulations (40 CFR Parts 1500-1508). The planning process described in these Guidelines and the CEQ and NEPA regulations are complementary.

e. Interdisciplinary Planning. An interdisciplinary approach should be used in planning to ensure the integrated use of the natural and social sciences and the environmental design arts. The disciplines of the planners should be appropriate to the issues identified in the scoping process. The planning agency should supplement its available expertise, as necessary, with knowledgeable experts from cooperating agencies, universities, consultants, etc.

f. Agency Decision Making. Decision making is a dynamic process that leads to selection of a recommended plan. Decision making begins at the field level and occurs at different levels through subsequent reviews and approvals as required by the agency until it reaches the level having authority to approve the project (final level). The individual in the responsible planning agency making the decisions at each level is referred to as the "agency decision maker." The identity of the agency decision maker depends upon the level of project development and review. For projects requiring congressional authorization, the final agency decision maker is the Secretary of the Department or head of the independent agency. For projects that do not require congressional approval, the final decision makers is the Secretary of the Department, head of the agency, or such other official as appropriately delegated.

g. Planning Area. The planning area is a geographic space with an identified boundary that includes:

(1) The area identified in the study's authorizing document;

(2) The locations of alternative plans, often called "project areas"; and

(3) The locations of resources that would be directly, indirectly, or cumulatively affected by alternative plans, often called the "affected area".

h. Scoping.

(1) Planning should include an early and open process termed "scoping" to identify both the likely significant issues to be addressed and the range of those issues. This process is complementary with the scoping process described in the CEQ NEPA regulations (40 CFR Parts 1500-1508). The agency should begin scoping as soon as practicable after a decision to begin planning. The scoping process should include affected Federal, State, and local agencies and other interested groups or persons. Scoping should be used as appropriate throughout planning

to ensure that all significant decision making factors are addressed and that unneeded and extraneous studies are not undertaken.

(2) As part of the scoping process, the agency should:

(a) Determine the extent to which the likely significant issues will be analyzed.

(b) Define the planning area based on the problems and opportunities and the geographic areas likely to be affected by alternative plans.

(c) Identify and eliminate from detailed study any issues that are not significant or that have been adequately covered by prior study. However, important issues, even though covered by other studies, should still be considered in the analysis.

(d) Identify any current or future planning that is related to but not part of the study under consideration.

(e) Identify review and consultation requirements so that cooperating agencies (as defined in 40 CFR 1508.5) may prepare required analyses and studies concurrently with the study under consideration.

(f) Indicate the tentative planning and decision making schedule.

(g) The scoping process should be integrated with other early planning activities.

(3) Scoping may be used to combine or narrow the number of problems and opportunities, measures, plans, effects, etc., under consideration so that meaningful and efficient analysis and choice among alternative plans can occur.

(4) Scoping should include consideration of ground water problems and opportunities, including conjunctive use of ground and surface water, and instream flow problems. Appropriate consideration should be given to existing water rights in scoping the planning effort.

i. Forecasting.

(1) Formulation and evaluation of alternative plans should be based on the most likely conditions expected to exist in the future with and without the plan. The without-plan condition is the condition expected to prevail if no action is taken. The with-plan condition is the condition expected to prevail with the particular plan under consideration.

(2) The forecasts of with- and without-plan conditions should use the inventory of existing conditions as the baseline, and should be based on consideration of the following (including direct, indirect, and cumulative effects):

(a) National/regional projections of income, employment, output, and population prepared and published by the Department of Commerce;

(b) Other aggregate projections such as exports, land use trends, and amounts of goods and services likely to be demanded;

(c) Expected environmental conditions [,especially trends in ecosystem change, which can be based on a variety of different sources of information available from Federal, state and local natural resource management agencies and private conservation entities];

(d) Specific, authoritative projections for small areas.

Appropriate national and regional projections should be used as an underlying forecasting framework, and inconsistencies therewith, while permissible, should be documented and justified.

(3) National projections used in planning are to be based on a full employment economy. In this context, assumption of a full employment economy establishes a rationale for general use of market prices in estimating economic benefits and costs, but does not preclude consideration of special analyses of regions with high rates of unemployment and underemployment in calculating benefits from using unemployed and underemployed labor resources.

(4) National and State environmental and health standards and regulations should be recognized and appropriately considered in scoping the planning effort. Standards and regulations concerning water quality, air quality, public health, wetlands protection, and floodplain management should be given specific consideration in forecasting the with- and without-plan condition.

(5) Other plans that have been adopted for the planning area and other current planning efforts should be considered.

(6) Forecasts should be made for selected years over the period of analysis to indicate how changes in economic and other conditions are likely to have an impact on problems and opportunities.

j. Prices.

(1) The prices of goods and services used for evaluation should reflect the real exchange values expected to prevail over the period of analysis. For this purpose, relative price relationships of outputs and inputs prevailing during, or immediately preceding, the period of planning generally represent the real price relationships expected over the life of the plan, unless specific considerations indicate real exchange values are expected to change.

[(2) Estimates of real price changes will not be used in evaluation without prior permission from HQUSACE. Should a district believe that unique circumstances require estimation of real price changes, the issue must be surfaced to CECW-P prior to expenditure of study resources. As needed, CECW-PD will assist in development of appropriate methods for evaluating expected real price changes.]

(3) The general level of prices for outputs and inputs prevailing during or immediately preceding the period of planning is to be used for the entire period of analysis. In the case of agricultural planning, normalized prices prepared by the Department of Agriculture should be used.

k. Discount Rate. Discounting is to be used to convert future monetary values to present values. Calculate present values using the discount rate established annually for the formulation and economic evaluation of plans for water and related land resources plans.

l. Period of Analysis.

(1) The period of analysis is to be the same for each alternative plan. the period of analysis is to be the time required for implementation plus the lesser of:

(a) The period of time over which any alternative plan would have significant beneficial or adverse effects; or

(b) A period not to exceed 100 years.

(2) Appropriate consideration should be given to environmental factors that may extend beyond the period of analysis.

m. Risk and Uncertainty--Sensitivity Analysis.

(1) Plans and their effects should be examined to determine the uncertainty inherent in the data or various assumptions of future economic, demographic, social, attitudinal, environmental, and technological trends. A limited number of reasonable alternative forecasts that would, if realized, appreciably affect plan design should be considered.

(2) The planner's primary role in dealing with risk and uncertainty is to identify the areas of sensitivity and describe them clearly so that decisions can be made with knowledge of the degree of reliability of available information.

(3) Situations of risk are defined as those in which the potential outcomes can be described in reasonably well-known probability distributions such as the probability of particular flood events. Situations of uncertainty are defined as those in which potential outcomes cannot be described in objectively known probability distributions.

(4) Risk and uncertainty arise from measurement errors and from the underlying variability of complex natural, social, and economic situations. Methods of dealing with risk and uncertainty include:

(a) Collecting more detailed data to reduce measurement error.

(b) Using more refined analytic techniques.

(c) Increasing safety factors in design.

(d) Selecting measures with better known performance characteristics.

(e) Reducing the irreversible or irretrievable commitments of resources.

(f) Performing a sensitivity analysis of the estimated benefits and costs of alternative plans.

(5) Reducing risk and uncertainty may involve increased costs or loss of benefits. The advantages and costs of reducing risk and uncertainty should be considered in the planning process. Additional information on risk and uncertainty can be found in Paragraph 5-12 of this chapter.

n. Documentation. Planning studies are to be documented in a clear, concise manner that explains the basic assumptions and decisions that were made and the reasons for them. The documentation should be prepared in a manner to expedite review and decision making.

5-6. Inventory and Forecast of Conditions Without a Plan.

a. Resource Conditions.

(1) An inventory should be made to determine the quantity and quality of water and

related land resources of the planning area and to identify opportunities for protection and enhancement of those resources. The inventory should include data appropriate to the identified problems and opportunities, as determined by scoping, and the potential for formulating and evaluating alternative plans. The inventory does not necessarily include an exhaustive listing of resources of the area. This inventory should describe the existing conditions and should be the baseline for forecasting with- and without-plan conditions.

(2) The most likely future condition without a plan should be used for evaluating the effects of alternative plans.

b. Problems and Opportunities.

(1) Inventory and forecasting should include an analysis of the identified problems and opportunities and their implications for the planning setting. Resource inventories should be limited to resources affecting the problems and opportunities or likely to be affected by the alternative plans. As alternative plans are developed or refined, the adequacy of these resource inventories should be reassessed. This analysis should be used to redefine the specific problems and opportunities associated with the Federal objective and other State and local concerns.

(2) Based on the analysis, an appraisal should be made of the potential for alleviating the problems and realizing the opportunities. The appraisal provides guidance on the possible scope and magnitude of actions needed to address each problem or opportunity. This appraisal should identify possibilities for management, development, preservation, and other opportunities for action. Resource inventories and forecasts may suggest additional problems or opportunities. These possibilities will indicate the resource capabilities relative to specific commodities, services, or environmental amenities desired by the public. By proper selection of these development or management possibilities, alternatives may be formulated for each problem or opportunity.

5-7. Alternative Plans.

a. General.

(1) An alternative plan consists of a system of structural and/or nonstructural measures, strategies, or programs formulated to alleviate specific problems or take advantage of specific opportunities associated with water and related land resources in the planning area.

(2) Alternative plans should be significantly differentiated from each other.

(3) Alternative plans should not be limited to those the Federal planning agency could implement directly under current authorities. Plans that could be implemented under the

authorities of other Federal agencies, State and local entities, and nongovernment interests should also be considered.

(4) Alternative plans may either--

(a) Be in compliance with existing statutes, administrative regulations, and established common law; or

(b) Propose necessary changes in such statutes, regulations, or common law.

(5) A range of measures that can, over time, balance water demand for various purposes with water availability should be considered, including measures that will--

(a) Reduce the demand for water;

(b) Improve efficiency in use and reduce losses and waste;

(c) Improve land management practices to conserve water;

(d) Increase the available supply of water, [and/or,

(e) Restore degraded ecosystem functions.]

(6) Nonstructural measures should be considered as means for addressing problems and opportunities.

(a) Nonstructural measures are complete or partial alternatives to traditional structural measures. Nonstructural measures include modifications in public policy, management practice, regulatory policy, and pricing policy.

(b) A nonstructural measure or measures may in some cases offer a complete alternative to a traditional structural measure or measures. In other cases, nonstructural measures may be combined with fewer or smaller traditional structural measures to produce a complete alternative plan.

(7) Protection of the Nation's environment [from adverse effects] is to be provided by mitigation (as defined in 40 CFR 1508.20) of the adverse effects (as defined in 40 CFR 1508.8) of each alternative plan. Accordingly, each alternative plan should include mitigation determined to be appropriate by the agency decision maker.

(a) Appropriate mitigation to address effects on fish and wildlife and their habitat should be determined in consultation with Federal and State fish and wildlife agencies in accordance with the Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661-666(c)), or other appropriate authority.

(b) Appropriate mitigation to address other adverse effects should be determined in accordance with applicable laws, regulations and Executive Orders.

(c) Mitigation measures determined to be appropriate should be planned for concurrent implementation with other major project features, where practical.

(8) Other existing water and related land resources plans, such as State water resources plans, should be considered as alternative plans if within the scope of the planning effort.

(9) Various schedules, including staged construction, for implementing alternative plans should be considered.

b. Formulation.

(1) Alternative plans which contribute to the Federal objective should be systematically formulated. In addition to a plan which reasonably maximizes contributions to NED, other plans may be formulated which reduce net NED benefits in order to further address other Federal, State, local, and international concerns not fully addressed by the NED plan. [Specifically, plans contributing to ecosystem restoration may be formulated.] These additional plans should be formulated in order to allow the decision maker the opportunity to judge whether these beneficial effects outweigh the corresponding NED losses.

(2) In general, in the formulation of alternative plans, an effort is made to include only increments that provide net NED [or NER] benefits after accounting for appropriate mitigation costs. Include appropriate mitigation of adverse environmental effects, as required by law, in all alternative plans. Increments that do not provide net NED benefits may be included, except in the NED plan, if they are cost-effective measures for addressing specific concerns.

(3) Alternative plans, including the NED plan, [the NER plan and the optimum tradeoff plan,] should be formulated in consideration of four criteria: completeness; effectiveness; efficiency; and acceptability.

(a) Completeness is the extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. This may require relating the plan to other types of public or private plans if the other plans are crucial

to realization of the contributions to the objective.

(b) Effectiveness is the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities.

(c) Efficiency is the extent to which an alternative plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment. [Efficiency is also related to the irreversible and irretrievable commitment of resources within the human environment, as defined by NEPA implementing regulations.]

(d) Acceptability is the workability and viability of the alternative plan with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and public policies.

c. [Required Plans.]

(1) The NED Plan. A plan that reasonably maximizes net national economic development benefits, consistent with the Federal objective, is to be formulated. This plan is to be identified as the national economic development plan.

[(2) The NER Plan. For single purpose ecosystem restoration studies, a plan that reasonably maximizes net national ecosystem restoration benefits, consistent with the Federal objective, is to be formulated. This plan should be identified as the national ecosystem restoration plan.

(3) The Optimum Tradeoff Plan. For planning which includes NED and NER outputs other than mitigation, a plan that reasonably maximizes the sum of net national economic development and net national ecosystem restoration benefits, consistent with the Federal objective, is to be formulated. This plan should be identified as the optimum tradeoff plan.]

d. Other Alternative Plans.

(1) Other alternative plans should be formulated to adequately explore opportunities to address other Federal, State, local, and international concerns not fully addressed by the NED[, NER or optimal tradeoff] plan.

(2) The number and variety of alternative plans should be governed by--

(a) The problems and opportunities associated with the water and related land resources in

the study area;

(b) The overall resource capabilities of the study area;

(c) The available alternative measures; and

(d) Preferences of and conflicts among State and local entities and different segments of the public.

(3) When institutional barriers would prevent implementation of an economically attractive plan, alternative plans which include removal of those barriers should be presented where such plans are implementable.

5-8. Accounts.

a. General.

(1) Four accounts are established to facilitate evaluation and display of the effects of alternative plans. These accounts are: national economic development (NED), environmental quality (EQ), regional economic development (RED), and other social effects (OSE). These four accounts encompass all significant effects of a plan on the human environment as required by the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.). They also encompass social well-being as required by Section 122 of the Flood Control Act of 1970 (Pub. L. 91-611, 84 Stat. 1823). The EQ account shows effects on ecological, cultural, and aesthetic attributes of significant natural and cultural resources that cannot be measured in monetary terms. The OSE account shows urban and community impacts and effects on life, health and safety. The NED account shows effects on the national economy. The RED account shows the regional incidence of NED effects, income transfers, and employment effects.

(2) The NED account is the only required account. Other information that is required by law or that will have a material bearing on the decision making process should be included in the other accounts (EQ, RED, and OSE) or in some other appropriate format used to organize information on effects.

(3) The same effect may be shown only once within a given account except that the OSE account may show the incidence of an effect from more than one point of view. Beyond this exception, claiming the same benefit, cost, change in a resource attribute, or effect more than once in a given account would constitute double counting.

(4) Relationships between short-term use of the human environment and the maintenance

and enhancement of long-term productivity should be displayed. Any irreversible or irretrievable commitments of resources should be displayed.

(5) Effects on the values and attributes of ground water and instream flow should be displayed.

(6) Effects of an alternative plan in the displays are the differences between the forecasted conditions with the plan and forecasted conditions without the plan.

(7) Effects in the NED account are to be expressed in monetary units. EQ effects are to be expressed in appropriate numeric units or non- numeric terms. RED and OSE effects are to be expressed in monetary units, other numeric units, or non-numeric terms.

(8) Monetary values are to be expressed in average annual equivalents by appropriate discounting and annualizing techniques using the applicable discount rate.

b. National Economic Development Account.

(1) General.

(a) The NED account describes that part of the NEPA human environment, as defined in 40 CFR 1508.14, that identifies beneficial and adverse effects on the economy.

(b) Beneficial effects in the NED account are increases in the economic value of the national output of goods and services from a plan; the value of output resulting from external economies caused by a plan; and the value associated with the use of otherwise unemployed or under-employed labor resources.

(c) Adverse effects in the NED account are the opportunity costs of resources used in implementing a plan. These adverse effects include: Implementation outlays, associated costs, and other direct costs.

[(d) NED effects and environmental effects are evaluated incrementally.]

(e) Procedures which should be used for evaluating NED effects are in Chapter Six of this regulation.

(1) When an alternative procedure provides a more accurate estimate of a benefit, the alternative estimate may also be shown if the procedure is documented.

(2) Steps in a procedure may be abbreviated by reducing the extent of the analysis and amount of data collected where greater accuracy or detail is clearly not justified by the cost of the plan components being analyzed. The steps abbreviated and the reason for abbreviation should be documented.

(3) Proposals for additions to or changes in the NED procedures may be made when an agency head determines that the new technique will improve plan formulation and evaluation. These proposals are to be submitted to the Water Resources Council for review and approval for inclusion. Procedures which represent changes in established policy are to be referred to the Cabinet Council on Natural Resources and Environment for its consideration.

(2) Goods and services: General measurement standard. The general measurement standard of the value of goods and services is defined as the willingness of users to pay for each increment of output from a plan. Such a value would be obtained if the "seller" of the output were able to apply a variable unit price and charge each user an individual price to capture the full value of the output to the user. Since it is not possible in most instances for the planner to measure the actual demand situation, four alternative techniques can be used to obtain an estimate of the total value of the output of a plan: Willingness to pay based on actual or simulated market price; change in net income; cost of the most likely alternative; and administratively established values.

(a) Actual or simulated market price. If the additional output from a plan is too small to have a significant effect on price, actual or simulated market price will closely approximate the total value of the output and may be used to estimate willingness to pay. If the additional output is expected to have a significant effect on market price and if the price cannot be estimated for each increment of the change in output, a price midway between the price expected with and without the plan may be used to estimate the total value.

(b) Change in net income. The value of the change in output of intermediate goods and services from a plan is measured by their total value as inputs to producers. The total value of intermediate goods or services to producers is properly measured as the net income received by producers with a plan compared to net income received without a plan. Net income is defined as the market value of producers' outputs less the market value of producers' inputs exclusive of the cost of the intermediate goods or services from a plan. Increased net income from reduced cost of maintaining a given level of output is considered a benefit since released resources will be available for production of other goods and services.

(c) Cost of the most likely alternative. The cost of the most likely alternative may be used to estimate NED benefits for a particular output if non-Federal entities are likely to provide a similar output in the absence of any of the alternative plans under consideration and if NED benefits cannot be estimated from market price or change in net income. This assumes, of course, that society would in fact undertake the alternative means. Estimates of benefit should be based on the cost of the most likely alternative only if there is evidence that the alternative would be implemented. In determining the most likely alternative, the planner should give adequate consideration to nonstructural and demand management measures as well as structural measures.

(d) Administratively established values. Administratively established values are proxy values for specific goods and services cooperatively established by the water resources agencies. An example of administratively established values is the range of unit-day values for recreation.

(3) Goods and services: Categories. The NED account includes goods and services in the following categories:

(a) Municipal and industrial (M&I) water supply
(b) Agricultural floodwater, erosion and sedimentation reduction

(c) Agricultural drainage

(d) Agricultural irrigation

(e) Urban flood damage reduction

(f) Power (hydropower)

(g) Transportation (inland navigation)

(h) Transportation (deep draft navigation)

(i) Recreation

(j) Commercial fishing

(k) Other categories of benefits for which procedures are documented in the planning report and which are in accordance with the general measurement standards in paragraph 5-8 b.(2) of this section.

(4) Other direct benefits. The other direct benefits in the NED benefit evaluation are the

incidental direct effects of a project that increase economic efficiency and are not otherwise accounted for in the evaluation of the plan or project. They are incidental to the purposes for which the water resources plan is being formulated. They include incidental increases in output of goods and services and incidental reductions in production costs. For example, a project planned only for flood damage reduction and hydropower purposes might reduce downstream water treatment costs; this reduction in costs would be shown as another direct benefit in the NED account.

(5) Use of otherwise unemployed or underemployed labor resources.

(a) The opportunity cost of employing otherwise unemployed and underemployed workers is equal to their earnings under the without plan conditions.

(b) Conceptually, the effects of the use of unemployed or underemployed labor resources should be treated as an adjustment to the adverse effects of a plan on national economic development. Since this approach leads to difficulties in cost allocation and cost sharing calculations, the effects from the use of such labor resources are to be treated as an addition to the benefits resulting from a plan.

(c) Beneficial effects from the use of unemployed or underemployed labor resources are limited to labor employed on site in the construction or installation of a plan. This limitation reflects identification and measurement problems and the requirement that national projections are to be based on a full employment economy.

(d) If the planning region has substantial and persistent unemployment and these labor resources will be employed or more effectively employed in installation of the plan, the net additional payments to the unemployed and underemployed labor resources are defined as a benefit.

(6) Adverse NED effects: Measurement standards.

(a) In evaluating NED costs, resource use is broadly defined to include all aspects of the economic value of the resource. This broad definition requires consideration of the direct private and public uses that producers and consumers are currently making of available resources or are expected to make of them in the future.

(b) If market prices reflect the full economic value of a resource to society, they are to be used to determine NED costs. If market prices do not reflect these values, then an estimate of the other direct costs should be included in the NED costs.

(c) NED costs may reflect allowance for the salvage value of land, equipment, and facilities that would have value at the end of the period of analysis.

(7) NED cost categories. For convenience of measurement and analysis, NED costs should be classified as implementation outlays, associated costs and other direct costs.

(a) Implementation outlays. These are the financial outlays (including operation, maintenance and replacement costs) incurred by the responsible Federal entity and by other Federal or non-Federal entities for implementation of the plan in accordance with sound management principles. These costs do not include transfer payments such as replacement housing assistance payments as specified in 42 U.S.C. 4623 and 4624.

(b) Associated costs. These are the costs in addition to implementation outlays for measures needed to achieve the benefits claimed during the period of analysis. For example, associated costs would include the cost of irrigation water supply laterals if they are not accounted for in the benefit estimate.

(c) Other direct costs. These are the costs of resources directly required for a project or plan, but for which no implementation outlays are made. These costs are uncompensated, unmitigated NED losses caused by the installation, operation, maintenance, or replacement of project or plan measures. Examples of other direct costs include increased downstream flood damages caused by channel modifications, dikes, or the drainage of wetlands, increased water supply treatment costs caused by irrigation return flows, and displaced public recreation.

c. Environmental Quality Account.

(1) General.

(a) The EQ account is a means of displaying and integrating into water resources planning that information on the effects of alternative plans on significant EQ resources and attributes of the NEPA human environment, as defined in 40 CFR 1507.14, that is essential to a reasoned choice among alternative plans. Significant means likely to have a material bearing on the decision making process.

(b) Beneficial effects in the EQ account are favorable changes in the ecological, aesthetic, and cultural attributes of natural and cultural resources.

(c) Adverse effects in the EQ account are unfavorable changes in the ecological, aesthetic, and cultural attributes of natural and cultural resources.

(d) A suggested procedure which may be used for evaluating effects included in the EQ account appears in Chapter III of these Guidelines.

(2) Significant EQ resources and attributes.

(a) An EQ resource is a natural or cultural form, process, system, or other phenomenon that--

(1) Is related to land, water, atmosphere, plants, animals, or historic or cultural objects.

(2) Has one or more EQ attributes (ecological, cultural, aesthetic).

(b) EQ attributes are the ecological, cultural, and aesthetic properties of natural and cultural resources that sustain and enrich human life.

(1) Ecological attributes are components of the environment and the interactions among all its living (including people) and nonliving components that directly or indirectly sustain dynamic, diverse, viable ecosystems. In this category are functional and structural aspects that require special consideration because of their unusual characteristics.

(2) Cultural attributes are evidence of past and present habitation that can be used to reconstruct or preserve human lifeways. Included in this category are structures, sites, artifacts, environments, and other relevant information, and the physical contexts in which these occur.

(3) Aesthetic attributes are perceptual stimuli that provide diverse and pleasant surroundings for human enjoyment and appreciation. Included in this category are sights, sounds, scents, tastes, and tactile impressions, and the interactions of these sensations, of natural and cultural resources.

(c) Significant EQ resources and attributes should be identified based on institutional, public, and technical recognition.

(3) Significant effects.

(a) An effect on an EQ resource occurs whenever estimates of future with- and without-plan conditions of the resource are different.

(b) An effect may be described in terms of duration, frequency, location, magnitude, and other characteristics, such as reversibility, retrievability, and the relationships to long-term productivity, where their description is relevant and useful to decision making.

(c) The significance of an effect may be established based on institutional, public, and technical recognition.

(4) Summary. There should be an overall summary of significant beneficial and adverse effects on EQ resources.

d. Regional Economic Development Account.

(1) General.

(a) The RED account registers changes in the distribution of regional economic activity that result from each alternative plan. Two measures of the effects of the plan on regional economies are used in the account: Regional income and regional employment.

(b) The regions used for RED analysis are those regions within which the plan will have particularly significant income and employment effects. Effects of a plan not occurring in the significantly affected regions are to be placed in a "rest of nation" category.

(c) Effects that cannot be satisfactorily quantified or described with available methods, data, and information or that will not have a material bearing on the decision making process may be excluded from the RED account.

(2) Positive effects on regional economic development.

(a) Regional income. The positive effects of a plan on a region's income are equal to the sum of the NED benefits that accrue to that region, plus transfers of income to the region from outside the region.

(1) Regional incidence of NED benefits. Because of the definition of region used for the RED account, all or almost all of the NED benefits for the plan will accrue to that region, plus transfers of income to the region from outside the region.

(2) Transfers. Income transfers to a region as a result of a plan include income from: Implementation outlays, transfers of basic economic activity, indirect effects, and induced effects. In each case income transfers refer to increases in net income within the region rather than to increases in total expenditure.

(i) Income from implementation outlays is that portion of project outlays that becomes net income in the regional economy, exclusive of NED benefits from use of otherwise unemployed or underemployed labor resources.

(ii) Income from transfers of basic economic activity is net income from economic activity that locates in the region as a direct result of differences between the with- and without-plan conditions.

(iii) Income from indirect effects is regional net income resulting from expansion in the production of inputs to industries supplying increased final products and regional exports.

(iv) Income from induced effects is regional net income resulting from changes in consumption expenditures generated by increases in personal income.

(b) Regional employment.

(1) The positive effects of a plan on regional employment are directly parallel to the positive effects on regional income, so that analysis of regional employment effects should be organized in the same categories using the same conceptual bases as the analysis of positive regional income effects. Regional employment associated with each of the regional income categories should be calculated and listed accordingly.

(2) To the extent practical, planning reports should provide reasonable estimates of the composition of increased employment according to relevant service, trade, and industrial sectors, including a separate estimate for agriculture. The nature of the employment increase to each sector should be classified as to the level of skill required--unskilled, semiskilled, and highly skilled.

(3) Negative effects on regional economic development.

(a) Regional income. The negative effects of a plan on a region's net income are equal to the sum of the NED costs of the plan that are borne by the region, plus transfers of income from the region to the rest of the Nation.

(1) Regional incidence of NED costs. The NED costs of a plan that are borne by a region should be organized in the same categories used in the cost section of the NED account. Information from the cost allocation and cost sharing analysis undertaken as a part of the planning process will be needed to estimate these direct expenditures.

(2) Transfers. Income transfers from the region include net income losses from plan-induced shifts of economic activity from the region to the rest of the Nation and losses in existing transfer payments, plus any impacts that may affect the region as a result of NED costs or

transfers from the region.

(b) Regional employment.

(1) The negative effects of a plan on regional employment should be organized and analyzed using the same categories and conceptual bases used for negative regional income effects (paragraph 5-8 d.(3)(a) of this section).

(2) The incidence of negative regional employment effects should be shown in a manner similar to that required for the positive regional employment effects.

(4) Relationship between RED and NED effects. Income information in the RED account should be organized in the same categories as the NED effects. The relationship between the affected regional economies and the national economy should be recognized. Since the NED account registers all effects on the national economy, any differences between the regional and national economic effects of a plan take the form of transfers from the rest of Nation. The effects of these transfers should be listed in a "rest of Nation" category. The effects in the rest of Nation category are equal to the difference between the RED effects and NED effects of a plan. This rest of nation category should be displayed in the RED account together with the RED and NED effects.

e. Other Social Effects Account.

(1) General.

(a) The OSE account is a means of displaying and integrating into water resource planning information on alternative plan effects from perspectives that are not reflected in the other three accounts. The categories of effects in the OSE account include the following: Urban and community impacts; life, health, and safety factors; displacement; long-term productivity; and energy requirements and energy conservation.

(b) Effects may be evaluated in terms of their impacts on the separate regions and communities affected.

(c) Effects on income, employment, and population distribution, fiscal condition, energy requirements, and energy conservation may be reported on a positive or negative basis. Effects on life, health, and safety may be reported as either beneficial or adverse. Other effects may be reported on either a positive/negative basis or a beneficial/adverse basis.

(d) Effects that cannot be satisfactorily quantified or described with available methods,

data, and information or that will not have a material bearing on the decision making process may be excluded from the OSE account.

(2) Urban and community impacts.

(a) A formal treatment of urban related impacts is not required for implementation studies. However, types and locations of significant impacts, broken down by salient population groups and geographic areas, may be reported in the OSE account.

(b) The principal types of urban and community impacts are--

(1) Income distribution.

(2) Employment distribution, especially the share to minorities;

(3) Population distribution and composition;

(4) The fiscal condition of the State and local governments; and

(5) The quality of community life.

(3) Life, health, and safety. Effects in this category include such items as risk of flood, drought, or other disaster affecting the security of life, health, and safety; potential loss of life, property, and essential public services due to structural failure; and other environmental effects such as changes in air or water quality not reported in the NED and EQ accounts.

(4) Displacement. Effects in this category include the displacement of people, businesses, and farms.

(5) Long-term productivity. Effects in this category include maintenance and enhancement of the productivity of resources, such as agricultural land, for use by future generations.

5-9. Displays.

a. General.

(1) Displays are graphs, tables, drawings, photographs, summary statements, and other graphics in a format that facilitates the analysis and comparison of alternative plans. Concise,

understandable displays are helpful during the planning process and provide documentation in compliance with NEPA.

(2) Displays should facilitate the evaluation and comparison of alternative plans necessary to make the following determination:

(a) The effectiveness of given plans in solving the problems and taking advantage of the opportunities identified in the planning process.

(b) What must be given up in monetary and nonmonetary terms to enjoy the benefits of the various alternative plans.

(c) The differences among alternative plans.

b. Content and Format. The content and format of the displays should be determined by the planning agency according to the following guidance:

(1) Existing and forecasted resource conditions without any of the alternative plans and the problems and opportunities related to the planning setting should be reported.

(2) Displays regarding reasonable alternatives, including those required by NEPA, should include the following items:

(a) Measures in each plan.

(b) Effects in the NED account.

(c) Other effects, when shown in either the EQ, RED, and OSE accounts, or in some other appropriate format.

(3) For the recommended plan, an aggregate display of effects on natural and cultural resources, in the format of Table 5-1, should be included.

(4) A matrix should be included which shows existing or planned Federal and non-Federal projects or facilities having significant economic, environmental, or physical interactions with the recommended plan together with a brief narrative description of these interactions.

(5) Alternative actions that were considered but were not developed into plans should be described briefly. The descriptions should include the measures and effects and the reasons for not proceeding further.

Table 5-1

Effects of the Recommended Plan on Natural and Cultural Resources

Types of resources	**Authorities**	**Measurement of effects/1**
Air quality	Clean Air Act, as amended (42 U.S.C. 1857h-7 et seq.).	(Enter area, in square miles, where State air quality classifications would change for each affected classification.)
Areas of particular concern within the coastal zone.	Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451 et seq.).	(Enter gains and losses, in appropriate units.)
Endangered and threatened species.	Endangered Act of 1973, as amended (16 U.S.C. 1531 et seq.).	(Enter list of species affected and area of each critical habitat type gained and lost, in acres.)
Fish and Wildlife habitat.	Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.)	(Enter area of each habitat type gained and lost, in acres.)
Floodplains	Executive Order 11988, Floodplain Management.	(Enter area gained and lost, in acres.)
Historical and cultural properties.	National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq.).	(Enter number and type of National Register [listed or eligible] properties.
Prime and Unique farmland.	CEQ Memorandum of August 1, 1980: Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act.	(Enter area of farmland type and gained/lost in acres.)
Water quality	Clean Water Act of 1977, as amended (42 U.S.C. 1857h-7 et seq.)	(Enter length in miles for water course, and area in acres for water bodies, where State water quality classifications would change for each affected classification.)
Wetlands	Executive Order 11990, Protection of	(Enter area of each wetland type gained and

Types of resources	Authorities	Measurement of effects/1
	Wetlands; Clean Water Act of 1977, as amended (42 U.S.C. 1857h-7 et seq.).	lost, in acres.)
Wild and Scenic Rivers.	Wild and Scenic Rivers Act as amended (16 U.S.C. 1271 et seq.)	(Enter length of each river type gained and lost, in miles.)
1/If a type of resource is not present in the planning area, enter "Not present in planning area." If a type of resource is not affected, enter "No effect."		

5-10. Cost Allocation.

a. General.

(1) The need for cost allocation stems from pricing and cost-sharing policies that vary among purposes. Cost allocation is the process of apportioning total project financial costs among purposes served by a plan.

(2) Financial costs are implementation outlays, transfer payments such as replacement housing assistance payments as specified in 42 U.S.C. 4623 and 4624, and the market value of contributions in kind, e.g., lands.

(3) Financial costs are to be allocated to those purposes for which the plan is formulated. These purposes do not include other direct benefits (see Paragraph 5-8(b)4) and use of otherwise unemployed or underemployed labor resources. All purposes are to be treated comparably.

b. Definitions.

(1) Separable cost for each purpose in a plan is the reduction in financial cost that would result if that purpose were excluded from the plan. This reduction in cost includes:

(a) The financial cost of measures serving only the excluded purpose; and

(b) Reductions in the financial cost of measures serving multiple purposes. In some cases removal of a purpose would result in selection of different measures to address the remaining purposes.

(2) Joint cost is the total financial cost for a plan minus the sum of separable financial costs for all purposes.

(3) Alternative cost for each purpose is the financial cost of achieving the same or equivalent benefits with a single-purpose plan.

(4) Remaining benefit for each purpose is the amount, if any, by which the NED benefit or, when appropriate, the alternative financial cost exceeds the separable financial cost for that purpose. The use of alternative cost is appropriate when alternative financial cost for the purpose is less than the NED benefit, or when there are project purposes that do not address the NED objective.

c. Cost Allocation Standard. Costs allocated to each purpose are the sum of the separable cost for the purpose and a share of joint cost as specified below:

(1) Joint cost may be allocated among purposes in proportion to remaining benefits.

(2) Joint cost may be allocated in proportion to the use of facilities, provided that the sum of allocated joint cost and separable cost for any purpose does not exceed the lesser of the benefit or the alternative cost for that purpose.

d. Allocation of Constituent Cost. Cost-sharing policies for some purposes pertain to cost constituents such as construction costs, and operation and maintenance costs. Costs for each cost constituent specified in the relevant cost-sharing policy should be allocated among purposes.

5-11. Plan Selection.

a. General. The planning process leads to the identification of alternative plans that could be recommended or selected. The culmination of the planning process is the selection of the recommended plan or the decision to take no action. The selection should be based on a comparison of the effects of alternative plans. (See Paragraph 5-7 b, Alternative Plans, Formulation.)

b. Selection.

(1) The alternative plan with the greatest net economic benefit consistent with protecting the Nation's environment (the NED plan) is to be selected unless the Secretary of a department or head of an independent agency grants an exception when there is some overriding reason for selecting another plan, based upon other Federal, State, local, and international concerns.

[(a) Ecosystem restoration is a recognized high priority purpose. Thus, for plans having only ecosystem restoration outputs, the plan with the greatest net ecosystem restoration benefits, and for plans having both economic and restoration benefits, the plan with the greatest net sum of economic and restoration benefits is to be selected, consistent both with protecting the Nation’s

environment and Secretarial exception, as discussed immediately above.

(b) When a project has only monetized NED effects the recommendation should be for that alternative and scale having the maximum excess of monetized benefits over costs (net benefits are maximized). Maximum excess benefits occur where the incremental benefit-cost ratio equals 1.0; the maximum excess benefits plan is also known as the NED plan.

(c) When a project has only non-monetized environmental effects the concept of maximum excess of beneficial effects over costs is retained even though an objective numeric evaluation is not possible. The recommendation should be for that alternative and scale having the maximum excess of (subjectively valued) beneficial effects over costs. This plan occurs where the incremental (subjectively valued) beneficial effects just equal the incremental costs, or alternatively stated, where the extra environmental value is just worth the extra costs. This plan should be called the NER plan. In making these value and cost comparisons it is assumed that each plan and scale is the minimum cost way of achieving that level of output; i.e., that an appropriate least cost or cost effectiveness algorithm was used in their development.

(d) When a project has both NED benefits and NER effects (multipurpose) the recommended plan should be "best" in the sense that no alternative plan or scale has a higher excess of NED benefits plus NEQ effects over total project costs. This plan should be called the optimum tradeoff plan.

(1) Distinct implementation actions may produce only NED outputs or only NER outputs, and involve no conflicts of space utilization, water utilization or land use, and if so no question of trading off one output for another arises. In other cases more of one output (say, NER) can only be obtained by accepting less of another (say, NED). Formulating NED - NER tradeoffs are acceptable. In other words tradeoffs between NED outputs and NER outputs are permissible, and should be made as long as the value of what is gained exceeds its implementation cost plus the value of what is foregone.

(2) Thus, trade NED benefits in favor of NER outputs as long as the incremental (subjective) value of the NER outputs exceeds the sum of NED benefits foregone plus incremental costs. Incremental costs equal added cost necessary to realize added environmental outputs less reduced cost permitted by reduced NED outputs. Make all such trades of one output for another until it is not possible to make further trades improving the total project. Naturally, the potential trades go in both directions, more NER output for less NED output and more NED output for less NER output. This is a formulation-evaluation process by which the optimum tradeoff plan is discovered.

(e) Benefit-cost ratios are not relevant for environmental projects, and environment

specific costs are not included in the benefit-cost ratio for a multipurpose project. Displays in Tables 5-2, 3 and 4 illustrates several cases. In the first example, Table 5-2, the project produces only NED benefits. In the second example, Table 5-3, the project produces only environmental benefits. In this example, several plan scales are shown so that the public and decision makers know at what level of incremental and total output the costs of the incremental units just equals the subjective valuation of their worth. Since a recommendation depends on this subjective evaluation of worth, which is not readily displayed in a table, no recommended plan is indicated. In the third example, table 5-4, the project produces NED and NEQ outputs. For the first two displayed plan scales there is no interaction between NED and environmental outputs and thus no tradeoff. The third plan scale indicates that the next increment of environmental outputs requires an additional environmental implementation cost of $5 and the foregoing of $10 in NED benefits, resulting in incremental adverse effects of $15. For this plan to be recommended the subjective worth of the additional environmental outputs would need to be (at least) $15. Total project costs are $150 but the benefit-cost ratio is based only on costs associated with the NED benefits, $110. Any of the displayed plans could be the recommended plan, provided that the economic development plan under consideration maximizes NED benefits or that the restoration plan under consideration is shown to be most cost effective .]

Table 5-2. Project Produces only NED benefits

BENEFITS ($)	COSTS (4)*	BENEFIT-COST RATIO
150	100	1.5

*Includes justified mitigation cost, if any.

Table 5-3. Project produces only NER outputs.

Environmental Outputs (Units)	Costs ($)	Cost per Unit ($)	Incremental Cost per Unit ($)
40	80	2.00	Not Available
50	105	2.10	2.50
60	135	2.25	3.00

(2) The alternative of taking no action, i.e., selecting none of the alternative plans, should

be fully considered.

(3) Plan selection is made by the agency decision maker for Federal and Federally-assisted plans. Agency officials and State and local sponsors may recommend selection of a plan other than the NED plan. The agency decision maker (the Secretary of a department or the head of an independent agency) will determine whether the reasons for selecting a plan other than the NED plan merit the granting of an exception.

(4) The basis for selection of the recommended plan should be fully reported, including considerations used in the selection process.

(5) Plans should not be recommended for Federal development if they would physically or economically preclude non-Federal plans that would likely be undertaken in the absence of the Federal plan and that would more effectively contribute to the Federal objective when comparably evaluated.

Table 5-4. Project produces NED and NER outputs.

NED Benefits ($)	Costs ($)	Benefit Cost Ratio	Net Benefits ($)	NEQ Outputs (Units)	Costs ($)	NED Benefits Foregone ($)	Total Adverse ($)	Cost per Unit	Inc Cost per Unit ($)	Total Project Cost ($)
140	110	1.3	30	40	30	0	30	0.75	NA	140
140	110	1.3	30	43	35	0	35	0.81	1.67	145
130	110	1.2	20	50	40	10	50	1.00	2.14	150

5-12. Risk and Uncertainty--Sensitivity Analysis. Uncertainty and variability are inherent in water resources planning. For example, there is uncertainty in projecting such factors as stream flows, population growth, and the demand for water. Therefore, the consideration of risk and uncertainty is important in water resources planning. This paragraph provides guidance for the evaluation of risk and uncertainty in the formulation of water resources management and development plans.

a. Concepts.

(1) Risk. Situations of risk are conventionally defined as those in which the potential outcomes can be described in reasonably well known probability distributions. For example, if it

is known that a river will flood to a specific level on the average of once in 20 years, a situation of risk, rather than uncertainty, exists.

(2) Uncertainty. In situations of uncertainty, potential outcomes cannot be described in objectively known probability distributions. Uncertainty is characteristic of many aspects of water resources planning. Because there are no known probability distributions to describe uncertain outcomes, uncertainty is substantially more difficult to analyze than risk.

(3) Sources of risk and uncertainty.

(a) Risk and uncertainty arise from measurement errors and from the underlying variability of complex natural, social, and economic situations. If the analyst is uncertain because the data are imperfect or the analytical tools crude, the plan is subject to measurement errors. Improved data and refined analytic techniques will obviously help minimize measurement errors.

(b) Some future demographic, economic, hydrologic, and meteorological events are essentially unpredictable because they are subject to random influences. The question for the analyst is whether the randomness can be described by some probability distribution. If there is an historical data base that is applicable to the future, distributions can be described or approximated by objective techniques.

(c) If there is no such historical data base, the probability distribution of random future events can be described subjectively, based upon the best available insight and judgment.

(4) Degrees of risk and uncertainty. The degree of risk and uncertainty generally differs among various aspects of a project. It also differs over time, because benefits from a particular purpose or costs in a particular category may be relatively certain during one time period and uncertain during another. Finally, the degree of uncertainty differs at different stages of the analysis--for example, between rough screening and final detailed design, when more precise analytic methods can be applied.

(5) Attitudes. The attitudes of decision makers toward risk and uncertainty will govern the final selection of projects and of adjustments in design to accommodate risk and uncertainty. In principle, the government can be neutral toward risk and uncertainty, but the private sector may not be. These differences in attitudes should be taken into account in estimating the potential success of projects.

b. Application.

(1) The role of the planner.

(a) The planner's primary role in dealing with risk and uncertainty is to characterize to the extent possible the different degrees of risk and uncertainty and to describe them clearly so that decisions can be based on the best available information. The planner should also suggest adjustments in design to reflect various attitudes of decision makers toward risk and uncertainty. If the planner can identify in qualitative terms the uncertainty inherent in important design, economic, and environmental variables, these judgments can be transformed into or assigned subjective probability distributions. A formal model characterizing the relationship of these and other relevant variables may be used to transform such distributions to exhibit the uncertainty in the final outcome, which again is represented by a probability distribution.

(b) At all stages of the planning process, the planning can incorporate any changes in project features that, as a result of information gained at that stage, could lead to a reduction in risk and uncertainty at a cost consistent with improvement in project performance.

(2) Some risk and uncertainty are assumed in nearly every aspect of a water resources project. Some types of risk and uncertainty are dealt with in terms of national planning parameters--for example, ranges of population projections and other principal economic and demographic variables. Other types of risk and uncertainty are dealt with in terms of project or regional estimates and forecasts. When projects are related to other projects and programs in their risk and uncertainty aspects (e.g., interrelated hydrologic systems), reasonable attempts should be made to see that the same analyses and presumed probability distributions are used for all of them.

(3) The risk and uncertainty aspects of projects are likely to be seen and analyzed differently as planning proceeds from rough screening to detailed project proposals. An effort should be made, therefore, to relate the techniques used in characterizing and dealing with risk and uncertainty to the stage of the planning process.

(4) The resources available for analyzing aspects of risk and uncertainty should be allocated to those assessments that appear to be the most important in their effects on project and program design. Rather than assuming in advance that one or another variable is a more important source of risk and uncertainty, the planner should make a thorough effort to determine which variables will be most useful in dealing with measurement errors and natural sources of risk and uncertainty.

(5) The aspects of project evaluation that can be characterized by a probability distribution based on reasonably firm data, such as hydrologic risk, can be treated by standard methods of risk evaluation developed by Federal agencies and others.

(6) Most risk and uncertainty aspects of projects cannot be characterized by probability distributions based on well established empirical data. A first step in dealing with this problem is to describe why the project or specific aspects of it are uncertain, as well as the time periods in which different degrees of uncertainty are likely. A range of reasonably likely outcomes can then be described by using sensitivity analysis--the technique of varying assumptions as to alternative economic, demographic, environmental, and other factors, and examining the effects of these varying assumptions on outcomes of benefits and costs. In some cases and in some stages of planning, this approach, when accompanied by a careful description of the dimensions of uncertainty, will be sufficient. It can be accompanied by descriptions of design adjustments representing various attitudes toward uncertainty.

(7) It may be appropriate in some cases to characterize the range of outcomes with a set of subjective probability estimates, but the project report should make clear that the numerical estimates are subjective. Moreover, subjective probability distributions should be chosen and justified case by case, and some description of the impact on design of other subjective distributions should be given. Design alternatives reflecting various attitudes toward uncertainty may be suggested.

(8) Utility functions may be used in conjunction with assessments of uncertainty to explore design adaptations reflecting specific preferences. Public preferences, if well known, may be used to illustrate to decision makers what the best design would be, given the uncertainties and preferences in a particular case. If public preferences are not well known, justification could be given for the selection of various utility functions, which can be used only to illustrate the effects on design of various preferences.

(9) At each level of analysis, the planner should take into account the differences in risk and uncertainty among project purposes and costs, among various time periods, and among different stages of planning.

(10) Adjustments to risk and uncertainty in project evaluation can be characterized as general or specific. General adjustments include the addition of a premium rate to the interest, overestimation of costs, underestimation of benefits, and limitations on the period of analysis. Such general adjustments are usually inappropriate for public investment decisions because they tend to obscure the different degrees of uncertainty in different aspects of projects and programs. Specific adjustments--including explicit assessments of different degrees of risk and uncertainty in specific aspects of a project or program and specific adjustments to them--are preferable. Additional information on methods of dealing with risk and uncertainty can be found in Paragraph 5-5 m.

(11) One guide to the use of the techniques discussed here is displayed in Table 5-2. In

general, more complex techniques are appropriate as planning proceeds from the initial development and the screening of alternatives to the analysis and presentation of the final set of alternative plans. for example, sensitivity analysis--testing the sensitivity of the outcome of project evaluation to variation in the magnitude of key parameters- -may be most useful and applicable in the early stages of planning, when the concern is to understand single factors or relatively general multiple-factor relationships. Multiple-factor sensitivity analysis, in which the joint effects or correlations among underlying parameters are studied in greater depth, may be more appropriate in the detailed analytic stage than in the screening stage.

Table 5-2
Planning Task and Approaches to Risk and Uncertainty

<----------Planning Tasks---------->			
Approaches to Risk and Uncertainty	**Screening Alternatives**	**Detailed Analysis of Projects**	**Final Presentation of Alternatives**
Sensitivity analysis	**X**	**X**	X
Use of objective and subjective probability distributions		**X**	X
Illustrative applications of public preference and decision makers' attitudes		X	X

(12) Similarly, analysis of risk and uncertainty based on objective or subjective probability distributions would be more appropriate in the detailed analytic stage than in the early screening stage. Although hydrologic and economic probabilities may be used in the screening stage, the full use of independent and joint probability distributions, possibly developed from computer simulation methods, to describe expected values and variances, is more appropriately reserved for

the detailed stage.

(13) Although decision makers' attitudes and decision rules can be used to give perspective on alternative designs through out the planning process, they are more appropriate at the stage of displaying alternative designs.

(14) The differences among the underlying degrees of risk and uncertainty, the design adaptations to them, and the preferences of decision makers should be kept clear throughout the analysis. The first two depend primarily on technical expertise; the last is the set of preferences based on various attitudes toward risk and uncertainty.

c. Report and Display. The assessment of risk and uncertainty in project evaluation should be reported and displayed in a manner that makes clear to the decision maker the types and degrees of risk and uncertainty believed to characterize the benefits and costs of the alternative plans considered.

SECTION II - ADDITIONAL PLANNING STANDARDS

5-13. Purpose. This section provides additional planning standards for conducting feasibility and preconstruction planning and engineering studies. The district commander shall assure that all applicable laws, policies, and planning guidelines, including the requirements and intent of Principles and Guidelines (P&G) and the National Environmental Policy Act (NEPA) are made an integral part of the planning process.

5-14. Compliance with Laws and Federal Policies. Commanders are responsible for compliance with Federal statutes and policies. See Table 2-4 which identifies some of the statutes requiring consideration in feasibility and preconstruction planning. Other valuable sources of information regarding applicable Federal laws and policies which are updated periodically include EP 1165-2-1, Digest of Water Resources Policies and Authorities, and the Civil Works Environmental Desk Reference, IWR Report 96-PS-3.

5-15. Regulatory Considerations. In the course of the feasibility study, consideration of DA regulatory programs (especially Section 10 of the River and Harbor Act of 1899, Section 404 of the Clean Water Act of 1972 and Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972) will be incorporated into the planning process to facilitate the permitting of activities essential to a successful project. The degree of consideration shall be appropriate to the nature of the project and the likely activities of project beneficiaries and sponsors.

a. Those areas regulated by the Corps shall be identified along with the type(s) of activities normally permitted, denied and conditioned within the study area. The regulatory requirements then will be taken into consideration when projecting likely future conditions. Estimates of future benefits attributable to the proposed Federal project shall recognize the influence of the regulatory program and shall not credit benefits to activities which likely would not be permitted within the study area.

b. In those instances where project beneficiaries and/or sponsors must accomplish specific permittable activities essential to the achievement of project benefits, requirements will be identified and completed to the extent possible during the feasibility study.

5-16. Selection of the NEDPlan or an Alternative Economic Development Plan.

a. Maximum Net Benefit. So that the relationship between costs and benefits is evident, the total benefits and total cost curves, and the incremental benefits and incremental cost curves shall be displayed for the final array of alternative plans. All real costs and benefits shall be

counted and exhibited in economic evaluations displays and benefit-cost ratios (BCR's).

b. NED Plan. The alternative plan with the greatest net economic benefits (NED plan) is required to be the plan recommended for Federal action, unless an exception is granted by the ASA(CW), or unless a study would qualify for the categorical exemption explained in Chapter 4, paragraph 4-3a. In presenting the NED plan, all reports must include appropriate information and data on a sufficient number of alternatives to define both the lower and upper portion of the net benefit curve. All project costs should be included in the final array of alternatives from which the NED plan is selected. Specifically, it is important that all environmental mitigation and losses be included for final array of alternatives before the NED plan is selected rather than afterward. The NED plan must be presented in detail in the feasibility report and carried forward through PED for comparative purposes, even if it is not the recommended plan for implementation. The NED plan is a Federally supportable plan.

c. Deviating from the NED Plan. If there are believed to be overriding and compelling reasons favoring the selection of a plan (larger or smaller) other than the NED plan, a clear and complete rationale must be presented in the report for a decision maker to evaluate the appropriateness of such a deviation. The principal overriding reason for selecting a plan other than the NED plan for implementation should be based on Federal, state, local, or international concerns. Recommended projects which are smaller (less costly) than the NED plan will normally be considered favorable for an exception to the NED requirements. Affordability is a valid reason for selecting a plan smaller than the NED plan. An exception granted by the ASA(CW) is cost shared the same as the NED plan and becomes a Federally supportable plan.

d. Locally Preferred Plan. In some cases where the local sponsor prefers a plan more costly than the NED plan, and the increased development is not sufficient to warrant full Federal participation the sponsor will be required to pay the difference in cost between the Federally supportable plan and the locally preferred plan. The locally preferred plan could be an extension of the Federally supportable plan, a larger plan, or a different plan. The locally preferred plan may be recommended for implementation by the Corps. The locally preferred project must be in compliance with Federal rules and statutes applicable to the Corps of Engineers projects developed in accordance with the principles and guidelines described in this regulation.

(1) Federal participation in the locally preferred plan is limited by the Federal share of the Federally supportable plan (described in paragraphs 5-16 b. and c. of this Section).

(2) The increment between the Federally supportable plan and the locally preferred plan should not be reflected in the BCR used for authorization and budgeting purposes; the increment will be designated as a sponsor's cost. This increment in costs is not eligible for crediting under Section 104 of PL 99-662. A requirement for the sponsor to pay one-hundred percent of this cost should be included as an item of local cooperation in the recommended plan.

(a) The locally preferred plan must have outputs similar in-kind, and equal to or greater than the outputs of the Federally supportable plan. It may also have other outputs.

(b) The incremental benefits and costs of the locally preferred plan, beyond the Federally supportable plan, must be analyzed and documented in feasibility reports.

(3) The project benefit-cost ratio for authorization and budgeting purposes will be for the Federally supportable plan.

5-17 Provision of Current Estimates of Project Benefits.

a. Background. Benefit-cost ratio computations, where required in support of funding requests, will be developed based on the benefits in the latest approved detailed economic analysis, annualized at the specified discount rates, if necessary. The latest approved analysis is defined as the last approved official document such as a Feasibility Report. Chief of Engineers Report, Reevaluation Report, Design Memorandum, or Special Study Report. The current project cost should be deflated to the same price level as in that approved analysis, annualized at the specified discount rates, and the BCR computed. The date of that analysis must be cited and should not be more than three years old for any projects funded under the PED program. If more than three years have elapsed since the latest approved analysis you must perform* a reevaluation in sufficient detail with supporting documentation to show that the project remains justified. The reevaluation method used shall be limited in that no major new analysis shall be conducted but rather previous assumptions reviewed and updated with techniques such as surveys and sampling employed to develop a reasonable estimate of project benefits.

b. Current Benefit Estimate Requirement. The economic analysis of all continuing PED's must be updated every three years to assure the currency of project economic justification and sponsor acceptance of the recommended plan. For all new PED's, new construction starts and other proposed new work, if the economic evaluation is more than three years old, an economic reevaluation must be the first item of work upon receipt of funds. Follow-on funding will be contingent upon approval of the economic reevaluation. The method employed in the reevaluation shall be documented in a Special Evaluation Report and included as part of the material submitted in support the follow on funding request. For new construction starts, if the limited reevaluation uncovers major changes that could affect project formulation or sizing, than additional PED funds rather than construction funds should be requested to undertake complete GDM level evaluation.

c. Feasibility Report Requirements for Documentation of a Plan for Obtaining Current Benefit Estimates. Feasibility reports, except those for continuing authorities, shall include a plan

delineating how current estimates of project benefits will be obtained in the future. Since the purpose of the plan is to provide procedures for deriving current analysis of a project's BCR, in no case will simple indexing of benefits be acceptable. The plan shall include discussions of the data that will be required and the procedures that will be employed.

d. Potential Elements of Plans that Produce Current Analysis of Benefits. Any set of procedures that result in a current analysis of benefits is acceptable. Procedures which amount solely to indexing of benefits are not acceptable. Examples of two procedures that could be formulated during feasibility studies, and which could be useful in providing current analysis in the future are sampling or monitoring and partial benefit reanalysis.

(1) Sampling or Monitoring. Focus should be on factors which are critical to project feasibility or are representative of major benefit categories, as appropriate. For example, in a fully developed floodplain a sample of structures may be selected to represent structure and content values for the floodplain. For a deep draft navigation project, if project feasibility depends critically on ships of given characteristics, develop a plan to monitor future use of these ships.

(2) Partial Benefit Reanalysis. This will not have nearly the depth or breadth of the feasibility study. It should be informative regarding current benefits and be accomplishable at reasonable cost however. For example, damage calculations at current prices for the sampled structures provide valuable information on the current level of flood control benefits. Recalculation of selected transportation cost savings using the current fleet and costs can be useful in re-estimating deep draft navigation benefits.

5-18. Maintenance of Project Justification Documentation. Records documenting the data, conduct, analyses and results of Feasibility studies recommending project authorization, and similar information for any subsequent re-evaluations, shall be maintained in files until either project construction is completed or the project is deauthorized. Documentation will be in sufficient detail to support the basis used to compute benefits and costs.

5-19. Risk, Uncertainty and Sensitivity Analyses. Some degree of risk and uncertainty is present in nearly every aspect of planning and implementing water resources projects. Planning itself, by progressing from reconnaissance studies to design memoranda, is in part an institutionalized response to information uncertainty. Within the planning process the principles and guidelines described in this regulation require that each factor that is critical to a recommendation, but is not known with certainty, be subject to analyses which reveal the nature and particularly the consequences of this uncertainty. This is so decision makers are aware of the range of available alternatives and the tradeoffs involved in choosing among them. The analyses which accomplish this are called risk and uncertainty, and sensitivity analyses. Paragraphs 5-5 m and 5-12 of Section I define the terms and provide the basic guidance to be used for the evaluation of risk and

uncertainty in the formulation of water resources management and development plans. See paragraph 4-11c for risk and uncertainty, and sensitivity analyses concerning low levels of protection.

a. Identification and Description of Risk and Uncertainty. Identify and describe clearly the degrees of risk and uncertainty inherent in economic, environmental and design variables which are important to the particular planning study in arriving at a recommended plan. Reconnaissance studies shall identify and include in report documentation those factors which are subject to uncertainty and which are critical to the recommendation of the reconnaissance report.

b. Sensitivity Requirements. Feasibility reports and detailed project reports shall contain discussions summarizing the critical sensitivity analyses that were undertaken as part of plan formulation, evaluation and selection. At a minimum this discussion shall address:

(1) All assumptions, predicted variables, estimated values, and parameter values which are critical to the report recommendation; and,

(2) The value of each critical factor where the recommendation would change or feasibility would be questioned. When the recommended plan is not the NED plan (i. e. a plan proposed for granted exception or locally preferred plan subject to additional cost sharing), the project outputs or environmental or design features or variables which form the basis for the recommendation are automatically included in (1) above.

5-20. Costs. The expression of cost is integral in the development, assessment and evaluation of water resource plans. Basic to the expression of costs is the distinction between those costs which are included in project costs and those which are excluded. The following discussion and examples are provided to clarify the differentiation of uses.

a. Real and Financial Costs. Two concepts of cost, real and financial, are used in Corps planning. The two are related but distinct. Care must be taken in their use. Synonymous with real cost are economic cost, resource cost and NED cost. Monetary cost and accounting cost mean the same as financial cost. It should be noted that the benefit to cost determination is founded on economic costs and may diverge from the baseline cost estimate assembled in accordance with the Project Management regulation.

(1) Real costs are values of resources. Resources are valued at their opportunity costs, that is, their value in the best alternative use. Opportunity cost is the conceptual basis for cost in economic analysis. In order for a resource to have a real cost or economic cost chargeable to a project the resource must have an alternative use(s). If there is no alternative use there is no economic cost.

(2) In most cases the real cost of a resource will be its market price. Exceptions are numerous enough, however. When market price is not an adequate representation of real resource cost, the real cost must be otherwise estimated or inputted (see Chapter 6, Section XII). Real costs are expressed in dollar terms but should not be confused with financial costs. Real costs exist or do not exist depending on whether resources with economic value are used; real costs exist independently of whether any financial payments are made. The presence of financial payments does not necessarily imply the presence of real costs.

(3) Real costs are used exclusively in all aspects of benefit-cost analysis, including benefit-cost ratios.

(4) Financial costs are any money outlays or accounting transactions or entries whether or not these are payments for resources.

(5) In most cases real costs and financial outlays (costs) will be identical. Examples are the costs of planning and design, and most of the costs of project implementation.

(6) There are many cases, however, where real costs and financial costs diverge.

(a) Care must be exercised in establishing the economic cost of some lands used for project purposes. For example, in many cases riverbanks generally do not have alternative uses (which would be precluded by the project) and therefore have little or no associated economic cost. While all land in the vicinity of rivers must be valued in light of flood risk, riverbanks generally must have alternative non project uses in order for an NED project cost to be charged.

(b) If, for example, riverbanks are thought to be valuable because they provide access for river recreation, or provide an amenity, an NED project cost will be assigned only if their use is significantly altered when used for project purposes. Thus, regardless of ownership, ordinarily planners should expect to assign nominal values to riverbanks used for project purposes. When riverbanks are thought to have higher than nominal values the source of the value shall be fully documented.

(c) River bottoms will ordinarily have no associated economic cost. In rare cases river bottoms may be mined for sand or gravel, or they may provide habitat for harvestable species. NED costs for river bottoms will be assigned only when these uses are documented and are significantly affected by a project.

(d) Lands already owned by a project sponsor or Federal Government will in general have an economic cost even though no financial cost is involved. The economic cost will usually be the

market value of these or similar lands. If the lands are committed to a particular purpose and the commitment will continue over the planning horizon in the absence of the project, the economic cost shall be the value of the land in the committed use, and not a market value. In such a case the value may be based on the benefits foregone, as when recreation land is used for project purposes.

(e) Land prices are influenced by the development and tax policies of local jurisdictions. When land cost differences are important to either project benefits or costs these shall be shown to be the result of real phenomenon (location, differences in transportation or access costs, productivity, etc.) and not tax or other financial incentives.

(7) When project benefits are due to differences in cost these shall be based on differences in resource use and not on differences in financial cost of the same or essentially similar resources. For example, benefits shall not be based on differences in wage rates for essentially the same jobs, as represented by differences in union versus non-union wages in the same locality. Similarly, there will generally be no resource savings when, for example, a ship's crew is proposed to perform stevedoring functions otherwise performed by longshoremen.

(8) The economic costs of producing outputs may be misstated because of accounting practices. That is, financial costs and economic costs may differ. For example, capital costs may be understated by being carried on books at historical values which are not representative of current values. On the other hand fixed costs may be allocated to individual units of output, thus overstating economic costs. Fixed costs are sunk and do not represent current use of resources.

(9) Taxes may or may not represent real costs depending on the degree of which they amount to payments for services (user fees). For example, if business real estate taxes at an industrial park are in effect payments for access roads and utilities hookups they consequently represent economic costs.

b. Purely financial costs are never relevant in economic analysis. Infrequently, some real or NED costs are excluded from project costs. For example, an NED cost excluded from project costs are the costs of betterments associated with some relocations. This approach is mandated as an alternative to evaluating the benefits of some relocation betterments.

5-21. Project Implementation Timing.

a. Project alternatives can differ in their timing as well as in their physical characteristics. As project on-line dates are varied, net benefits will usually vary. In general the more benefits vary through time the stronger this effect will be. Consider the optimal timing of projects and of individual project features in project formulation, so as to maximize discounted net benefits at the

expected time of project installation.

b. Consider management of demand or other nonstructural alternatives, in addition to structural measures, in formulating the NED plan. Examples are inland waterway congestion fees, or changes in water pricing or drought contingency plans. Such measures can delay optimal project on-line dates of structural measures, and increase total project net benefits over plans not including the nonstructural measures.

5-22. Project Cost Estimating and Scheduling.

a. Accuracy and Completeness. Accuracy and completeness of project cost estimates must be emphasized throughout the project development process, including the reconnaissance and feasibility phases. Even in these early phases cost estimates should represent as complete and as accurate a picture as is practicable. This is necessary for Federal and non-Federal sponsor planning and budgeting processes.

(1) Elements. The project cost estimate is the total cost (Federal and non-Federal) of implementing the project and includes the construction costs, lands, easements, rights-of-way, relocations, disposal areas (if needed), mitigation, add-ons such as engineering and design, and supervision and administration. The project cost estimate will be developed on a constant dollar basis.

(2) Presentation. Project cost estimates during study phases are often perceived to be more accurate than they are, and therefore, project documents must include a discussion of the elements that make up the project cost estimate and of their variability. The presentation of the project cost estimate is of particular importance in the feasibility study as it forms the basis for local decisions on project commitment and financing. It is also the basis for developing budget requests for implementation (inflation allowances are added separately). The project estimate prepared during the feasibility phase is generally the one presented to the Congress for authorization, although it may be revised during the early stages of preconstruction planning and design depending on the authorization cycle. Section 902 of WRDA '86 limits the authorization of projects in the Act to a 20% increase in the cost of that project (with increases due to inflation and increased requirements of law allowed). Without firm cost estimates and schedules, neither the Federal government nor the non-Federal sponsors can make prudent financial and budgetary decisions.

b. Study Management of Cost Estimates. During the study phase, the study management team (including the sponsor) must ensure that plans are formulated in such a way that constructability and operability are assured, that major cost items are adequately assessed or appraised as in the case of real estate, and that the uncertainty associated with the estimate is

properly presented. The study management team should also develop plans, with appropriate consideration for Corps plan formulation criteria under the Principles and Guidelines, with an awareness of the ultimate cost. With increased non-Federal financial responsibility for project planning and implementation and Federal emphasis on budgetary restraint, Commanders must be sensitive to real financial constraints on project scale. Accurate estimates of the costs of alternative plans play a vital role in plan formulation and project scoping. In any case, financial considerations must not be the sole criteria on which plan development rests, as the NED plan must still be identified. The goal of this approach is to reduce significant design changes after the feasibility phase.

c. Uncertainty in Cost Estimates. Project cost estimates should be supported by a discussion of the scope of the estimate and the uncertainties associated with each major cost item in the estimate. Special attention will be given to large cost items and items that are sensitive to change. Such increased effort on these high risk components will increase the reliability of the overall project cost estimate. The goal is a final project cost that will be within 20 percent of the estimated project cost in the feasibility report after appropriate adjustments for inflation. Based on such an approach, appropriate contingencies may be applied for each element to account for information that is lacking to more accurately establish its cost. General percentage contingencies applied to the entire project will not be used.

d. Life Cycle Costs. Life cycle costs will also be explicitly considered in the development of project cost estimates. These life cycle costs, including operation, maintenance, repair, replacement and rehabilitation (OMRR&R) costs as well as any necessary environmental monitoring and compliance inspection costs, play an important role in the trade-offs between high capital cost projects and those that have high operation and maintenance (O&M) costs. The sponsor's financial situation may accommodate one type of project better than another. The study management team should draw upon the O&M resources in the district to assist in developing accurate estimates for these costs. These costs should be presented on a constant dollar basis.

e. Full Funded Cost Estimates. Project cost estimates (defined in paragraph 5-22a. of this Section) will also be developed on an inflated dollar basis.

f. Review of Cost Estimates. Project cost estimates will be prepared by or reviewed by the cost engineering element in the district and the chief of that unit will sign the estimate. Real estate estimates included in the project cost are reviewed, approved and signed by chief or designee of the Real Estate Office.

5-23. Incremental Analyses - Maximum and Minimum Values. The NED plan is the plan that maximizes net monetary benefits. Discovering the NED plan requires varying both project costs and benefits so that the difference is as great as possible. In fish and wildlife mitigation and

ecosystem restoration planning the least cost plan that meets the environmental objectives must be formulated. Whenever benefits do not vary (either for technical reasons or because the desired output level has been established by other means), the least cost way of producing the outputs must be established.

a. Although maximum or minimum values can sometimes be obtained intuitively or by trial and error in relatively simple problems, it is difficult to document these processes. For more complex situations, these methods will either not work or be quite cumbersome. Therefore, when maximum or minimum values are required, a procedure that is recognized to result in these generally must be used and documented.

b. Incremental analysis is a method which is known to result in the desired maximum benefit or minimum cost solutions for a wide variety of planning problems. The principles and guidelines contained in this regulation requires documentation of the process by which recommendations result. Therefore, incremental analysis, or other established methodologies which are recognized as producing such maximum or minimum values, shall be used and documented in applying the Principles and Guidelines.

5-24. Sea Level Rise. The National Research Council (NRC) study on sea level change (Responding to Changes in Sea Level: Engineering Implications, 1987) is a practical and rational review of data on relative sea level changes and the resulting impact on engineering structures. The study should be used by the Corps for technical guidance until more definitive data are available. The NRC study recommended that feasibility studies for coastal projects should consider the high probability of accelerated sea level rise. Since precise estimates of future sea level rise are unknown, the risks associated with a substantial rise should be addressed. Feasibility studies should consider which designs are most appropriate for a range of possible future rates of rise. Strategies that would be appropriate for the entire range of uncertainty should receive preference over those that would be optimal for a particular rate of rise but unsuccessful for other possible outcomes.

a. Potential relative sea level change should be considered in every coastal and estuarine (as far inland as the new head of tide) feasibility study that the Corps undertakes. The degree of consideration that the possible change receives will depend upon the historical record for the study site. Areas which are already experiencing relative sea level rise or where increases are predicted should undertake an analysis as part of the study. Plans should be formulated using currently accepted design criteria.

b. For now, planning should consider what impact a higher relative sea level rises rate would have on the design based on the historical rate. A sensitivity analysis should be conducted to determine what effect (if any) changes in sea level would have on plan evaluation and selection.

This analysis should be based, as a minimum, on the extrapolation of the local, historical record of relative sea level rise as the low level and Curve III from the NRC report as the high level.

c. If the plan selection is sensitive to sea level rise, then design considerations could allow for future modification when the impacts of future sea level rise can be confirmed. It may be appropriate to consider plans that are designed for today's conditions but that incorporate features to facilitate future changes, or plans designed for future conditions. In these cases, an evaluation of the timing and the cost of potential changes should be conducted during the plan selection process.

SECTION III - PUBLIC INVOLVEMENT, COLLABORATION AND COORDINATION

5-25. Purpose. This section provides requirements for public involvement, collaboration and coordination in Civil Works planning studies.

5-26. Definitions.

a. Public. Any affected or interested entity; including Federal, regional, State and local government entities and officials, public and private organizations, Indian tribes, individuals, and study sponsor representatives.

b. Coordination. Formal exchange of information and views, by letter, report, meeting or other prescribed means, among the Corps and another agency or agencies, as required by and in accordance with purposes and procedures established by Federal policy (Public Law, executive order, agency regulation, memorandum of agreement, etc).

c. Collaboration. To work jointly with other agencies or entities. In this context, collaboration is distinguished from coordination through the active involvement of the parties in conducting studies and or implementing recommended projects. Collaborative efforts can range from participation on interagency study teams through joint funding of construction, operation or maintenance of water resource projects.

5-27. Goal and Objectives. The goal of public involvement and coordination is to open and maintain channels of communication with the public in order to give full consideration to public views and information in the planning process. The purpose of public involvement is to ensure that U.S. Army Corps of Engineers programs are responsive to the needs and concerns of the public. The objectives of public involvement are to provide information about proposed Corps activities to the public; make the public's desires, needs, and concerns known to decisionmakers; to provide for consultation with the public before decisions are reached; and to take into account the public's views in reaching decisions. All this must occur, however, with the awareness that the Corps cannot relinquish its legislated decisionmaking responsibility.

5-28. Requirements. District commanders shall conduct planning studies in an open atmosphere to attempt to attain public understanding, trust, and mutual cooperation and shall provide the public with opportunities to participate throughout the planning process. In addition, commanders shall:

a. Develop and implement an effective public involvement strategy as an integral part of the planning process for each study.

b. Develop and implement an effective management structure with non-Federal sponsor

involvement as an integral part of the feasibility study cost-sharing process.

c. Discuss in the report how information gained from public and sponsor involvement has been used in and influenced the planning process.

d. Distribute for comment a draft report and environmental document to appropriate Federal and State agencies, cooperating agencies and other members of the public (ER 200-2-2).

5-29. Public Involvement Strategy.

a. The Administrative Procedures Act, (including Section 3, the Freedom of Information Act) and the National Environmental Policy Act (PL 91-190), among others, are the principal legislative acts requiring public involvement. Federal planning policies, Corps practice, and regulations have consistently required and encouraged good public involvement. Generally, it is impossible to plan effectively for water resources development in accordance with Federal regulations and laws without good public involvement. Public involvement is integral to all phases and activities of the planning process.

b. The District Public Affairs Office (PAO) represents a valuable resource to the study manager, particularly in contacts with the media, and should be a participant in the study. In order to facilitate PAO participation, the responsibilities of the study manager and PAO should be defined early in the process.

c. Developing a Strategy. During the development of the PSP, the study team determines the extent of public involvement required and establishes an appropriate strategy for integrating public involvement into the planning process. Since there is no single best approach to public involvement, the study team should determine the best mix of public involvement methods. The important point to keep in mind is to provide an overall strategy that creates relevant, quality public involvement opportunities for those who have; or may have, an interest in the study. The purpose of initiating public involvement early in planning is to obtain a clear definition of public needs and concerns. Early involvement also provides a "sensing" stage during which an appraisal is made of the intensity of public interest, the kinds of publics most likely to participate, and the kinds of issues which are most likely to generate additional public interest.

(1) Components of a Strategy. A public involvement strategy should include:

(a) An analysis of the major issues likely to be addressed in the planning process.
(b) An identification of agencies, groups, and individuals most likely to be interested in the action under consideration.

(c) An assessment of the level of public interest likely to be generated by the action under consideration.

(d) A description of the preliminary consultation activities that led to development of the public involvement approach, including the agencies, groups, and individuals consulted.

(e) An identification of the public involvement expertise and effort that may be needed from various organizational units.

(f) Determination of appropriate review points at which to evaluate the structure and function of the public involvement program.

(g) A plan of sequential public involvement activities integrated with the planning and decisionmaking process, and development of planning reports.

(2) Major Public Involvement Activities

(a) Announce the Initiation of the Study. The public should be informed when a study is started. Announcements can be done through any of the communications media, but it is suggested that, at a minimum, a mailing of an announcement be made to potentially interested parties. The mailing method insures that at least those on the list have been made aware of the study initiation. If other media methods (such as TV, radio, newspapers, etc.) would be productive, they should also be pursued through coordination with the public affairs officer.

(b) Identify the Public. The Corps should be sensitive to public concerns and identify interested and affected parties including those who might be unaware of an action that could be of concern to them. Identifying publics is crucial both initially and throughout the planning effort. A starting point is to identify those people who believe themselves to be affected by possible study outcomes. Three ways are typically used to identify publics: self-identification, third party identification, and staff identification. Self-identification means that individuals or groups step forward and indicate an interest in participating in the study. Third party identification is a technique in which existing committees, interest groups, or representatives of known interests are asked to identify other individuals or interests who should be involved. Staff identification comprises a wide range of techniques including intuitive/experiential information, existing lists of groups and individuals, and geographic, demographic, and historical analysis. The nature of the planning study will determine who should be contacted. As a starting point, the following organizations, among others, should be considered: Environmental/Conservation groups; civic and neighborhood associations and community leaders; other Federal, State and local public agencies and entities; user groups; consumer and public interest groups; religious and ethnic groups; business groups, including small businesses and merchants; civil rights organizations;

labor organizations; and, organizations representing the handicapped, the elderly, the low income, the minorities, and the disadvantaged.

(c) The Scoping Process. Council on Environmental Quality regulations (40 CFR 1051.7) require that a process called "scoping" be utilized to identify the likely significant issues and the range of those issues. The regulations are very specific as to what is to be determined, but the techniques are left up to the agency. Since much of the information on significant issues rests only with the public, public involvement is the heart of the scoping process. Therefore, the public involvement should be an integral part of the scoping process. A scoping meeting (or meetings, if desired), should be held early in the study. Scoping meetings may be held informally with other Federal, State, local or private groups; however at least one of the scoping meetings should be broadly announced, held at a convenient location and time and open to all. Scoping should be used to focus in on specific issue areas. Therefore, while a broad scoping meeting may be desirable, it will not suffice for meetings that may be needed to target a specific audience, such as those with fish and wildlife interest.

(d) Input to Feasibility Reports. The Feasibility Reports shall include a description and evaluation of the efforts made to acquire public input and the information and opinions expressed prior to arriving at a decision. The public involvement section of the report shall show how the public input was used in the planning and decisionmaking process.

(e) Public Involvement Techniques.

(i) Dealing with the Media. Media relationships should be conducted by or through PAO. PAO is skilled in techniques for the presentation of information to the public and in techniques for dealing with various types and levels of the media.

(ii) Basic Communication Techniques. Technical experts often experience difficulty in communicating with non-technically oriented publics. Corps planners should know how to recognize values and develop skills to deal with different values. "Values" information is among the most important in the planning process. Values contain the information about what various publics think the plan "ought" to do. To be successful, the planning process must provide forums for dialogue among those holding different values, and facilitate discussion of meaningful trade-offs.

(iii) Meetings and Workshops. The guiding principle of designing meetings and workshops is that "format follows functions," meaning that the design of the meeting should reflect the purpose of the meeting. Meetings can serve five basic functions: information giving; information receiving; interaction; consensus forming/negotiation; and, summarizing. After determining a meeting purpose, the second most important issue facing the planner is room

arrangements. Room arrangements reflect the relationships among the participants and are a visual demonstration to participants to what the Corps expects from the meeting. The third major issue the planner faces is the choice of leadership style and meeting process. Numerous processes, most of which revolve around variations of nominal group techniques, are available to the planner. Within the various meeting processes, the planner should be aware of basic leadership style difference in "facilitating" versus "controlling" meetings. In designing a workshop, the planners should: identify the desired product; identify the resource information which the public will need; select a series of activities which will result in the desired product; and, design a simple mechanism for evaluating the workshop product. As the desired function moves closer to conflict resolution, the state of the arts in meeting design becomes more speculative.

(iv) Public Meetings. The need for public meetings in a particular study will depend on the study type and complexity. The Commander has the responsibility to determine if the public or the Corps or both would benefit by the exchange of views or information provided by public meetings. Public meetings should be designed to be fair and impartial two way communications and should be conducted informally and as simply as possible. The person facilitating the meeting should be: thoroughly familiar with the study; a rank or grade consistent with the audience expected; and skilled in group facilitation techniques. The Corps presentation should contain a brief summarization of the reason for the meeting and the progress of the study, and should provide ample opportunity for interested parties to share their viewpoints. The process used to achieve this exchange of views and information will be determined by the responsible Corps official. Meetings should be held at a time and locality convenient to the expected audience, normally in the area of the study. In cases where interest is very widespread, it may be appropriate to hold meetings away from the study area. The meeting announcement should be sent sufficiently in advance of the meeting to allow attendees to plan for the meeting and should contain sufficient information to allow the prospective attendee to decide if attendance would be beneficial. The meeting should be held at times convenient for working people to attend without requiring them to take leave time from their jobs. The language used in the announcement should be non-technical and the tone should reflect a sincere intent to produce a fair exchange and sharing of views and information. Distribution of the announcement should be as widespread as is consistent with the study and should include the members of Congress and the Governors of the States involved. The record of the meeting should be consistent with the type of meeting being held. A meeting involving great controversy may require a verbatim transcript, while a meeting of less intense controversy may require simply a short summarization.

f. Analyzing Public Comment. Typically, the Corps receives large amounts of solicited and unsolicited public comments on planning alternatives. This information comes in the form of public comments, (written and spoken) and letters. Additionally, written and spoken media, as well as past studies, are often available and normally contain a wealth of public comment information. The planner should systematically describe, analyze and evaluate the layers of

information usually contained in such public comments.

5-30. Study Management Coordination.

a. Conduct of Reconnaissance Studies. The management structure for the reconnaissance phase is described in Chapter 2, paragraph 2-9. Although the Corps is responsible for the reconnaissance phase, efficient execution of the feasibility phase requires a cooperative reconnaissance effort as well. Therefore, the time to begin assembling the study management structure should be as early in the reconnaissance phase as possible. The management structure will be formalized in the study Feasibility Cost Sharing Agreement (FCSA).

b. Conduct of Feasibility Studies. The management structure developed during the reconnaissance will remain in force during the feasibility phase. Some adaptations may have to be made in the Study Management Team and in the Executive Committee to reflect the sharing of study tasks as provided in the executed FCSA and PSP. Further discussion of the management structure of the feasibility phase is described in Chapter 2, paragraph 2-12.

5-31. Coordination with State and Local Governments Under E.O. 12372. Division and district commanders shall coordinate civil works planning programs with State and local governments in accordance with Executive Order 12372 (Intergovernmental Review of Federal Programs) and 33 CFR 384 (Intergovernmental Review of the Department of Army Corps of Engineers Programs and Activities). In addition:

a. Division and district commanders shall continue to directly notify all affected and interested State, area wide and local governmental interests and shall not rely on a state "single point of contact" (SPOC) to distribute notifications. Notices to interested parties shall reference E.O. 12372; shall indicate whether or not the program for which notice is being made has been selected by the affected state, or states, for coordination under the Executive Order procedures; shall state that comments and responses to the notice should be sent directly to a designated Corps official in addition to the state SPOC in those cases where the program has been selected, and shall not state that the public will be notified, if the report recommendations are materially modified prior to project approval.

b. Division commanders shall adopt such procedures as may be necessary to assure coordination is effected with states in a manner consistent with 33 CFR 384 and the processes established by the individual states. Problems should be referred to HQUSACE (CECW-P) if they cannot be resolved to the division commander's satisfaction in the field. Substantive comments received from a SPOC should be acknowledged in writing, even if SPOC comments are fully accommodated.

5-32. Public Notices. Public notices issued by field commanders will not contain language to the effect that the public will be notified, prior to final action, should report recommendations be materially modified prior to project approval.

5-33. Special Considerations.

a. Questionnaires. As required by Public Law 90-620, the Office of Management and Budget must approve any questionnaire to be responded to by 10 or more U.S. citizens or US firms, organizations, or agencies outside the Federal Executive Branch. Prior to the use of questionnaires for planning studies, field offices shall submit an SF 83 to HQUSACE (CECW-P). AR 335-15 Chapter 4, describes required information. OMB has pre-approved a group of questions for collection of planning data. See paragraph 6-158 for further discussion on OMB approved survey questionnaire.

b. Advisory Committees. Public Law 92-463 establishes approval and other requirements for advisory committees, boards, councils, conferences, panels, task forces, commissions or other similar groups formed in the interest of obtaining advice or recommendations. Advisory committees wholly comprised to full time officers or employees of the Federal Government, local civic groups whose primary function is rendering a public service with respect to a Federal program, or groups providing advice to State and local governments are exempt from those requirements. If an advisory committee not exempt from the Act is desired as a part of a study, approval shall be requested through HQUSACE (CERM). No advisory committee shall be established prior to approval. AR 15-1 describes information required to establish an advisory committee under the Act.

5-34. Exclusions. The Commander shall have the discretion to modify public involvement requirements for emergency planning studies under Section 14 of Public Law 79-526, as amended (Continuing Authorities).